

Knowledge, Attitude, and Practice of Dentists in Managing the Defective Direct Composite Restorations: A Questionnaire Survey

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ABSTRACT

Objective: Understanding the knowledge, attitude, and practice (KAP) of dentists in Makkah province of Saudi Arabia regarding managing of the defective composite restorations either by repairing or replacing them and which materials are used for the same in their day-to-day practice.

Methodology: A cross-sectional questionnaire survey consisting of 16 questions was developed and distributed electronically among 400 dental practitioners of Makkah province.

Results: Three hundred and fifty-one responses were received. Seventy-five percent of the participants have been taught the indications for replacement and repair of dental restorations during their undergraduate level. While 87% of them practice repairing and replacing the old composite restorations during their daily practice, only 48% actually follow a specific criteria to evaluate the existing composite restoration in their practice. 27.7% of the dentists felt that the partial loss of restoration was the most common indication for the repair of composite restoration followed by marginal staining of the restoration 26.6%. While the clinical diagnosis secondary caries (45.9%) was the most common indication reported for the replacement of composite restoration in our study. The responses from the dentists who participated in our study revealed that the preservation of the tooth substance (23.5%) was the most common reason behind the decision of repair of composite restoration and was cost-effective (22.6%). Majority of our participants (66.5%) felt that repair of the restoration neither protects the pulp nor increases longevity of the remaining restoration. Regarding the most common material used to repair the old composite restoration almost all the participating dentists (92%) used different types of composite systems for repair of old composite restorations.

Conclusion: Partial loss of the restoration was the most common reason for the repair of old restoration whereas secondary caries was the most common reason for replacement of restoration. Most of the dentists felt that the repair of the composite restoration preserved the tooth substance and was cost-effective. Different brands and types of composites were used in the replacement and repair of dental restorations. Though the majority of the dentists in the study have been taught the indications for replacement and repair of dental restorations during their undergraduate level and they do practice repair or replacement of composite restorations, following a specific criteria to evaluate the old or existing composite restoration must be emphasized and the students must be trained during their undergraduate level for the same.

Keywords: Attitude, Composite, Dentists, Knowledge, Practice, Survey.

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INTRODUCTION

Direct composite resins are currently the most popular restorative materials among dentists for restoring both anterior and posterior teeth and many other procedures. The great popularity of composites is attributed to their excellent esthetics, minimally invasive approach, micromechanical bonding, and economical as compared to indirect restorations. The composite restorations have shown good clinical performance with annual failure rates between 1 and 4% in both anterior and posterior teeth.¹ Though the newer composites have better physical and mechanical properties and the studies have shown that composite restorations have good clinical performance, like any other dental restorations they too have limited life span.² In a recent study, they found the survival rate of composite higher than amalgam restoration wherein the survival rate of composite restoration was about 91.7% in first 5 years and 82.2% in 10 years as compared to amalgam which showed survival rate 89.6% and 79.2%, respectively.³

The major drawback associated with composite resins is that they undergo polymerization shrinkage over time which further leads to discoloration, marginal deterioration, and secondary caries.⁴

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Consequently, these defective restorations will need management in day-to-day dental practice. This leads to a clinical situation for the dentists to make a routine decision between repair and replacement of the restoration.⁵ Though the composite restorations are routinely managed by repair or replacement, the criteria for decision-making and their implementation in daily practice are not clear.⁶ Hence, the present questionnaire survey aims at understanding the knowledge, attitude, and practice (KAP) of dentists in Makkah province of Saudi Arabia regarding managing of the defective composite restorations either by repairing or replacing them and which materials are used for the same.

METHODOLOGY

To investigate the preferences of dentists of Makkah province in managing the defective direct composite restorations a cross-sectional survey based on questionnaire consisting of 16 questions was developed from a similar study conducted in King Abdul Aziz University, Jeddah, Saudi Arabia, and further modified for use in the present survey.⁷ The survey questionnaire was pretested for content validity and clarity by the subject experts in the institute.

The sample size was calculated using G-power with 95% confidence interval (CI), 5% marginal error, for 3,967 population size of Makkah region.⁸

Three hundred and fifty-one dentists practicing in Makkah region were required for the study. The questionnaire form was sent to the participants electronically through online portal along with consent form after approval from the Ethical Committee of Ibn Sina National College for Medical Studies, Jeddah, Saudi Arabia.

The questionnaire survey inquired about the KAP of treating a defective composite restoration. The questionnaire consisted of four sections. In the first section, the demographic data of dentists related to their gender, work experience, and their practice location were asked. In the second section, there were four knowledge-related questions. The third section consisted of three attitude-related questions. The last section enquired about the practice of the dentist in managing the defective composites, which had six questions. The survey consisted of 15 questions with binary or multiple choice responses and the last question (no. 16) required to be answered with a short answer on the type of material they will be using in repair of direct composites.

RESULTS

The completed questionnaire responses were coded and data were entered and analyzed using Statistical Package for the Social Sciences (SPSS) Version 22.0. Four hundred general dentists were invited to participate of which number of responses were 351 and the responses rate was 67%.

There were around 138 (35.04%) male participants and 228 (64.96%) female participants.

Eighty-six percent of the participants had more than 6 years of experience [1–5 years = 14% (50), 6–10 years = 45% (159), 11–20 years = 30% (104), and >20 years = 11% (38)]. Around 48% (167) of the participants practiced in town, 29% (101) in city, and 24% (83) practiced in rural areas. Seventy-five percent (265) of the respondents reported that they have been taught the techniques for composite repair during their undergraduate level and around 48% (167) of the participant dentists mentioned that

they follow a specific criteria like modified USPHS or FDI in order to evaluate old/existing composite restorations. Around 31% of the participants mentioned that they do not know any such criteria.

The results of our study showed that mostly adults (40%) required repair or replacement of restorations as compared to adolescents (13%) and elderly patients (16%) whereas around 30% of the participants responded that they cannot specify the age-group which requires management of restoration. Majority of the dentists (79%) considered patient preferences for repair or replacement of the defective restorations. Seventy-five percent (264) of the respondents mentioned that age of the composite filling influenced their decision for repair or replacement for the same. Sixty-six percent (232) of the participants felt that the patients prefer repair of the old/existing restoration rather than new restoration.

Around 87% (306) of the respondents performed repair/replacement of composite restorations during their practice. The partial loss of restoration 27.7% (274) was the most common indication for the repair of composite restoration followed by marginal staining of the restoration 26.6% (263) and marginal defect of the restoration 24.8% (246). While the clinical diagnosis of secondary caries 1.0% (10) was the least common reason reported for the repair of composite restoration (Table 1).

The clinical diagnosis of secondary caries [45.9% (316)] was the most common indication reported for the replacement of composite restoration. While the discoloration of the restoration [3.5% (24)] was the least common indication reported for the replacement of composite restoration (Table 2).

The reasons for decision for the repair restoration are shown in Table 3.

The responses from the dentists who participated in our study revealed that the preservation of the tooth substance (23.5%) was the most common reason behind the decision of repair of composite restoration. Whereas 22.6% of the participants decided to repair the restoration for its cost-effectiveness, followed by the less time consumption procedure as compared to replacement (20.4%). While extending the longevity of the restoration (16.8%) and pulp

Table 1: Common indications for the repair of defective composite restoration in your dental practice

<i>Clinical diagnosis</i>	<i>N</i>	<i>Percent</i>
Marginal staining of the restoration	263	26.6
Partial loss of restoration	274	27.7
Secondary caries	10	1.0
Marginal defect of the restoration	246	24.8
Superficial correction of anatomy	197	19.9

Table 2: Common indications for the replacement of defective composite restoration in your dental practice

<i>Clinical diagnosis</i>	<i>N</i>	<i>Percent</i>
Discoloration of the restoration	24	3.5
Partial loss of restoration	40	5.8
Secondary caries	316	45.9
Fracture of the restoration	194	28.2
Fracture of the tooth	65	9.4
Other reasons	50	7.3

protection (16.7%) were the least common reasons reported for the repair of composite restoration.

Dentists more likely preferred to repair composite restorations than their replacement as it preserves the existing tooth structure, lowers the costs, and reduces the treatment time. However, majority of our participants (66.5%) felt repair of the restoration neither protects the pulp nor increases longevity of the remaining restoration.

Table 4 shows the most commonly used materials by the participants for repairing the composites.

Almost all the participating dentists (92%) used different types of composite systems for repair of old composite restorations. Very few of them (6%) used DMG which is commercially available composite repair system. Only 1 (0.2%) participant chose GIC for repair and 4 (1.1%) participants replaced the old restoration with indirect restorations like full crown (0.8%) or inlay (0.2%).

DISCUSSION

The aim of the present cross-sectional questionnaire survey was to understand the KAP of dentists in Makkah province of Saudi Arabia regarding managing of the defective composite restorations and the materials used for the same. With the questionnaire based surveys the risk in relation to reliability of responses vs nonresponse bias cannot be eliminated.⁵ However, the response rate in our study was around 67% which reached the number of required sample size of 351 responses.

The management of composite restorations with localized defects poses various challenges to the dentist. Hickel and Manhart believed that repair or replacement of defective restoration are related to dentist factors, properties of material used, and patient factors.⁹ However, the longevity of a restoration is invariably affected by the choice of repair vs replacement of a defective composite filling.^{10,11} The academicians in conservative dentistry

around the world agree that repair of composite restoration has more advantages compared to their replacement.^{12,13}

The most important findings in our study was that around 75% of dentists have been taught about the techniques of composite repair during their undergraduate dental training to consider composite repair as a viable treatment option for defective restorations which is consistent with the results obtained by Yousef and Khoja,⁷ a study which was also conducted in Saudi Arabia and was in contrast with the response received in a study done by Fayyaz et al. among Pakistani dentists⁵ and a study by Al-Badri et al. done in Iraq where only 39% of the dentists and 17.9% were taught or trained for composite repair during their undergraduate level, respectively.¹⁴ However, only 48% of the participants mentioned that they follow a specific criteria like modified USPHS or FDI to evaluate old restorations which is not considered in any of repair or replacement studies conducted till now.

Around 87% of the participants in our study performed repair or replacement of the defective composite restorations in their daily practice which was consistent with studies done by Kanzow et al.² and result was better than the study done by Fayyaz et al.⁵ in which only 60% of the participants performed composite repair whereas in a study by Al-Badri et al. the number was only 40.8%.¹⁴

The results of our study revealed that partial loss of restorations was the most common indication (27.7%) for the repair of composite restorations and secondary caries (1%) was the least common indication. These results closely corresponded to the findings from various similar studies conducted previously.^{2,7,15,16} However, the research from Al-Badri et al. showed higher percentage of dentists replacing tooth colored restorations due to fracture.¹⁴ The main reason for this was an associated tooth fracture which demanded the complete restoration to be replaced rather than being repaired. The repair of fractured or lost restoration can be considered with proper diagnosis of factors leading to the fracture of the restorations and in cases where risk of fracture is minimal.¹²

The proportion of respondents who did not repair composite restorations (13%) in our study was lesser compared to the number who performed repair (87%) which was comparable with studies from Switzerland, Canton of Zurich, Germany, and Norway.^{2,15,16}

Secondary caries was the most common indication for replacement of composite restoration in our study (45.9%). Secondary caries is usually difficult to diagnose clinically and there are more chances of caries spreading below the existing restoration undermining the restoration which is difficult to control if part of the restoration is left behind. Hence, more often the defective restorations with secondary caries are completely replaced.^{2,6,14} The results of our study were consistent with the studies performed by Kanzow et al.^{2,14} and Mjör et al.⁶ but was in contrast with the study performed by Gordan et al.¹³ where the restorations with secondary caries were most likely to be repaired rather than those with fractures.

Replacement of a previous composite restoration leads to loss of more tooth structure as preparation is enlarged each time which is in turn time consuming and causes pulpal damage and also increases the chances of tooth crown fracture.^{4,5,7} Kallio et al. also reported that repairing of old restorations leads to tooth tissue preservation, less time consuming, and more cost-effective.¹⁷ Preservation of the tooth substance was the most common reason (23.5%) behind the decision of repair of composite restoration in the present study substantiating Kallio et al.'s research and the results were consistent with study performed by Yousef and Khoja.⁷ 22.6% of the participants in the study also felt repair to be cost-effective which

Table 3: Common reasons associated with the decision for the repair defective composite restoration (DCR) in your practice

	N	Percent
Cost-effective	184	22.6
Least time consuming procedure than replacement	166	20.4
Extend longevity of the restoration	137	16.8
Preservation of the tooth substance	191	23.5
Protection of the pulp	136	16.7

Table 4: Most commonly materials used for the repair DCR

Type of material used	Numbers of doctors
3M composite	170
Composite (not specified)	116
Kerr composite	35
DMG	20
Flowable composite	3
Full crown	3
Ceramic	1
GIC	1
Inlay	1



was in contrast to the results obtained by Yousef and Khoja.⁷ Pulp protection was the least common reason for repair of restorations according to our study.

SUMMARY

Our study mainly revealed that most of the participants (75%) have been taught the indications for replacement and repair of dental restorations during their undergraduate level. The study also evaluated if the participants are following any specific criteria to evaluate old restorations for their repair or replacement. Our study revealed that though 87% of the dentists practice repairing and replacing the old composite restorations during their daily practice, only 48% actually follow a specific criteria to evaluate the existing composite restoration in their practice. This particular factor is not evaluated in any of the similar studies conducted till now.

Partial loss of the restoration was most common reason for the repair of old restoration whereas secondary caries was the most common reason for replacement of restoration. Most of the participant dentists felt that the repair of the composite restoration preserved the tooth substance and was cost-effective. Also patients preferred repair of the existing restoration rather than placing a new restoration. Different brands and types of composites were used in the replacement and repair of dental restorations.

LIMITATIONS

The main limitation of our survey was representativity of the population of dentists as it was confined to general dental practitioners of a particular region (Makkah region) and due to the possibility of only motivated dentists taking part in the surveys, the responses cannot be generalized to a larger population or other regions of the country.

The survey was conducted during the times of Corona crisis and digital approach served better tool for data collection. However, online questionnaire surveys are challenging as the respondents may lack access to the digital resources. Our survey questionnaire consisted of close-ended questions and open-ended questions. Though close-ended questions make surveys easy to analyze, they may have a lower validity rate as they lack nuance, response options may be leading to the participants, compel them to choose one of the given options, and they may not cover all the options. Whereas, open-ended questions might lead to interviewer bias as it may be hard to analyze and compare.

Due to these limitations, a larger population, particularly for a certain specialty, age, and experience group among dentists can be considered for further studies. The results of online questionnaire surveys based on clinical practice must be regarded as tentative and should not be considered as a replacement for randomized controlled trials or any kind of traditional study design.

CONCLUSION

Though the majority of the dentists in the study have been taught the indications for replacement and repair of dental restorations during their undergraduate level and they do practice repair or replacement of composite restorations, following a specific criteria to evaluate the old or existing composite restoration must

be emphasized and the students must be trained during their undergraduate level for the same.

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